# On the evolution of anthophilous Nitidulidae (Coleoptera) in tropical and subtropical regions

A. G. Kirejtshuk

Abstract. Independent appearance of anthophagy among different nitidulid groups is considered. Circumstances and regular ways of this process are traced and explained. Similar correlations in transformations of structures, trophics and mode of life among anthophagous forms from not related groups are shown. *Propetes* (*Propetes*) *aquilus* sp. n., *P.* (*P.*) *seychellensis* sp. n., *P.* (*Mandipetes*) *intritus* subgen. et sp. n., *P.* (*M.*) *longipes* subgen. et sp. n., *Brounthina aequalis* gen. et sp. n., *Caplothorax* subgen. n. and *Plapennipolus* subgen. n. in the genus *Carpophilus, Urocarpolus* subgen. n. in the genus *Nitops* stat. n. are described and proposed.

Key words. Anthophagy, specialisation, Nitidulidae, phylogeny, taxonomy.

## Introduction

This paper is based on a report read at the International Symposium on Biodiversity and Systematics in Tropical Ecosystems held on the 2—6 May 1994. Because of a necessity to add some taxonomical comments which had increased the text more than twice, the final version of the paper was submitted for publication separately from the proceedings of the symposium.

The anthophagy of beetles has drawn the attention of entomologists of many generations. There are a lot of publications on the importance of the anthophagy of beetles in the evolution of the higher plants, though there are few references where a possibility of reciprocal influence in coevolutionary interconnections between coleopterous groups and plants is regarded. The influence of plant food on the insects does not look so markedly in the results of phylogeny of the order Coleoptera in contrast with that of the angiosperm plants and therefore it is not considered to deserve any special investigation. The anthophagy of coleopterous adults and their larvae is usually studied without any link in the formation of these types of feeding, and a certain regularity in trophic transformation is as yet missed from consideration.

The Nitidulidae are a comparatively young family including many groups where we can find a considerable resemblance in transformations of structures, trophics and mode of life showing some more or less evident correlations. Such correlations are especially significant among some Nitidulid groups each of which independently became anthophagous (Kirejtshuk 1994a). Moreover, among the anthophilous Nitidulidae distributed in tropical and subtropical regions the regularities here under consideration are more obvious than in subpolar territories.

The Mesozoic Cucujoidea (including Nitidulidae) are only known from the Cretaceous. According to Dmitriev & Zherikhin (1988) the evident Cleroidea, Tenebrionoidea and Chrysomeloidea as well as extinct Parandrexidae with unclear position

appeared at least no later than the Jurassic. The true Nitidulidae together with other Cucujoid families have been found in different layers of the Cretaceous increasing in number to the end of this period (Ponomarenko 1983; Kirejtshuk & Ponomarenko 1990). If such a distribution in a certain sense reflects dynamics of the appearance of different coleopterous groups, in contrast to a widespread opinion, we are forced to assume that the Cucujoidea had risen no earlier but rather much later than Tenebrionoidea and Chrysomeloidea became distinctly recognisable groups to be identified in fossils. Diversification of the Cucujoidea seemed to arise and be proceeding when the characteristic mesozoic groups of plants became more and yet more rare until they were dislodged by the newly appeared angiosperm plants. Thus the evolution of the Cucujoidea is, perhaps, associated with the development of the Kainophytic flora, even in case this coleopterous group could take its origin somewhat earlier. Interconnections between the Cucujoidea and Kainophytic plants were initially mediated through fungi, and at the end of Cretaceous closer and more intimate interconnections seemingly began to establish at first with generative organs of both the gymnosperms and angiosperms and further on with other plant organs.

Some years ago a hypothesis on the most possible ways of transitions of beetles to feeding and breeding on living vegetative organs of the higher plants from initial (xylo) mycetophagy was proposed (Kirejtshuk 1989). According to it such transitions had an intermediate stage of feeding and breeding on the pollen and other parts of the generative plant organs. Appearance of complete (i.e. imaginal and larval) anthophagy or carpophagy is a rather important point for understanding the development of many phytophagous beetles which gave by present a wide scope of various trophic types. Primary formation of stable trophic connections with the generative plant organs opened a perspective for further expansion on other plant organs to the beetles.

When anthophagy arises, a special selective regime should be adhered. Essential component of this regime is some coincidence of insect development with the flowering period, i.e. the time of existence of available food and habitat. Not infrequent deviations in the time of maturation cause some advantages for the forms with a more rapid development. Acceleration of development is a more or less necessary attribute, which can be interpreted as an adaptation especially important for insects which acquire feeding and breeding in angiosperm flowers with a very short period of anthesis. This acceleration is accompanied by minimization in body size (or so-called miniaturization), and in the sequel with some pedomorphic transformations in imaginal structures as well as with desembryonization of larvae. Inhabitance of larvae inside or near concentrated food resource induces an inactive mode of life facilitating, in turn, desembryonization of larval development. The adaptive tendencies of the forms living in flowers and gymnospern cones are the same. It is possible to observe a convergent similization between the representatives of the Jurassic Parandrexidae (Kirejtshuk 1994b) and some extant *Propetes* from the Epuraeinae here described. That allows to postulate a syndrome of anthophagization at least for the infraorder Cucujiformia (including Chrysomeloidea).

A more common type of interactions between beetles and flowers or gymnosperm male cones looks like a simple feeding of insect adults on pollen. Many authors argue the cantharophilous theory considering that such interactions are unilateral or even

negative for any specimen of flowering plants. However we must admit a participation of beetles in the pollination of plants, including the participation of species whose larvae are not associated with plants. Imagines visited flowers occur among almost all Nitidulid subfamilies (except Calonecrinae, Amphicrossinae and Cybocephalinae). But an obliging attendance of imagines in generative plant organs with larval development in other localities is known among some representatives from the Epuraeinae and Nitidulinae.

One of the ways of acquiring generative plant organs can be observed in the mode of life of *Brachypeplus barronensis* Blackburn, 1902 connected with cycad *Macrozamia communis* in the temperate and subtropical rainforests of Eastern Australia. Imagines and larvae of this Nitidulid species inhabit the apex of cycad trunks between bases of young leaves and inside both male and female cones of this cycad. Together with the Nitidulids some coccids and pseudococcids live in the same places which yield a lot of sweet exudation which, in turn, give a good resource for growing yeast. The larvae and imagines of *Brachypeplus* feed on these fungi and the spores lavishly produced during a comparatively long period by male cycad cones. Inhabitance of the coccids in cycad cones is rather usual at present as it was in the past (Tang 1987). Joint life of beetles and Homoptera in cones of the plants could be an initial stage of transition to regular pollinophagy (or spermatophagy).

The second example gives the mode of life of Australian *Brachypeplus kemblensis* Blackburn, 1902 which inhabits inflorescences of *Alocasia macrorrhyza* from the Araceae (Shaw & Cantrell 1983). The inflorescence of this plant is presented with a long spadix, the basal part of which is covered with a rather big leaf sheet, restricting the free moving of insects in the middle of the spadix inside the inflorescence. Only flat and small beetles (Nitidulid *Brachypeplus kemblensis* and one Omaliinae species) can easily get in and out. At a certain stage of development of these inflorescences the apical staminate part of the spadix begins to decay assisted by the fungus *Fusarium* producing a substrate for developing dipteran and coleopterous larvae. Larvae of Omaliinae, perhaps, act mainly as predators of dipteran larvae (Neurochaeta), but larvae of *Brachypeplus* feed on both pollen and fungi in soft decaying spadix.

A classic example for the development of anthophagy is a mode of life of the Nitidulid *Neopocadius* and Oxycorinid *Hydnorobius* in flowers of the parasitic Neotropical plant *Prosopanche* from the Hydnoraceae (Bruch 1923). According to the opinion of Fegri and van der Peil (1982) the flowers of Hydnoraceae have some resemblance to the bisexual cones of Cycadeoides from the Bennettitales in the hard lignificated outer side as well as in the soft parenchyma of the inner side of these flowers. Moreover, Delevoryas (1968) admitted a considerable similarity also in the character of the holes perforated by insects in both species of plants (extinct and present).

After recent studies it is possible to trace independent transition on the angiosperm flowers and gymnosperm cones of some groups from the *Aethina*-complex of Nitidulinae genera, which includes 9 taxa: *Neopocadius, Brounthina* gen. n., *Idaethina, Anister, Olliffura*, subgenus "*A*", *Aethina, Circopes, Ithyra*. Some aspects of relations between these taxa we can see in fig. 1. The only species of *Neo-*
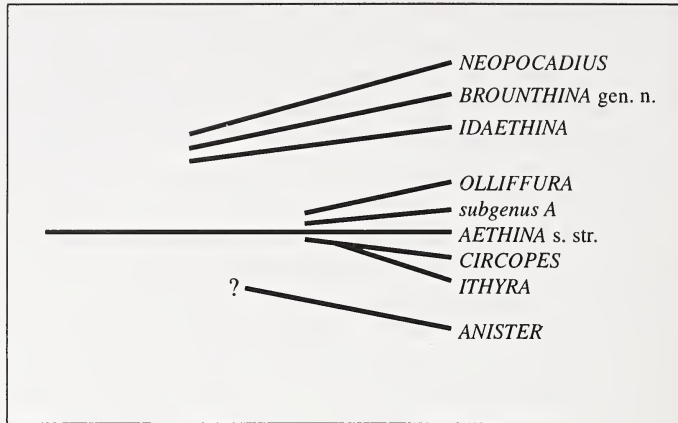
Fig. 1: Composition and tentative relations of the *Aethina*-complex of genera.

*pocadius* has been mentioned above. *Brounthina aequalis* gen. et sp. n. from New Zealand is known from imagines labelled without bionomical data. Representatives of *Anister* from the Afrotropical and Cape regions, and also from Mediterranean and Indochina are exclusively anthophagous in imaginal stage and miners in larvae. Some endemic Australian species of *Idaethina* feed and breed inside seed capsules of *Brachychiton* (Sterculiaceae), and others are connected with seeds of plants from the Proteaceae. The rest groups of the *Aethina*-complex of genera can be divided into two pairs of taxa (*Olliffura* and subgenus "*A*", on the one hand, and *Circopes* and *Ithyra*, on the other hand) especially close to *Aethina* s. str., linking both pairs. The subgenus *Olliffura* is distributed only in the Indo-Malayan, Australian and Papuan regions. Both larvae and imagines of this subgenus live in flowers of the Malvaceae (mainly *Hibiscus*). The subgenus "*A*" includes only 4 species (3 of them remaining undescribed: 1st — from Himalayas and Indochina, 2d — from Sulawesi, 3d — from Australia, 4th — New Hebrides; for now there is no information on their bionomy). The *Ithyra* species occur in the Afro-Madagascarean regions, one of them recorded from Yemen and Sicilia. Species of this group are connected with flowers of Acantaceae. The subgenus *Circopes* is composed of species from different regions of the Eastern Hemisphere (including Australia), though in the Palaearctic region the habitat of this group does not extend beyond the Palaearctic or East-Chinese subregion. Imagines of some *Circopes* species visit both flowers and tree fungi, others have been collected only on blossoming plants, and others show adherence to inflorescences of monocotyledonous plants or cones of cycads where their larvae develop. Finally, the subgenus *Aethina* s. str. has the widest distribution (except a main part of the Holarctic regions, as well as Australian, Papuan, Polynesian and Patagonean regions). Many species of the last group are in all active stages of their living circle connected with substrates decaying with an assistance of fungi, including soft fruits of angiosperms, but some species of it visit blossoming plants, and *Aethina tumida* can breed in stores of pollen and honey in nests of the domestic honey bee.

Thus, feeding on living plants has been independently acquired at least by 5 groups of this genera complex: 1. *Neopocadius*, 2. *Idaethina*, 3. *Anister*, 4. *Olliffura*, 5. *Circopes-Ithyra*. Anthophagy in the *Olliffura* species was establishing, perhaps, with the separation of this group from *Athina* s. str. or later (in case we get to know that the subgenus "*A*" species are not anthophagous). Anthophagy of *Circopes* and *Ithyra* appeared when their common ancestor had been secluded from the *Aethina* s. str. as some of them preserve an adherence to fungi. Larval mining and imaginal anthophagy of *Anister* is correspondent with the stage next after complete anthophagy in my scheme of probable ways of trophic transformation. The complete (imaginal and larval) carpophagy of the *Idaethina* species could also be a consequence of regular ways of transition mentioned above.

In the considered complex of genera it is easy to trace decrease in the body size of imagines and larvae (miniaturization), and also some correlation in pedomorphic transformations of imaginal structures with the profundity of anthophagization. These pedomorphic transformations are expressed in general simplification of structures, shortening of elytra, reduction of surface sculpture and pubescence. As an expression of adaptive tendency to larval desembryonization we can regard a progressive reduction of many body appendages and chaetotaxy as well as simplification in mouth parts. Mining larvae of *Anister* species have obsolete appendages on tergites and lacking urogomphi. Thus, in the considered complex of genera we can observe transformation of larval structures from the silphoid type of differentiation especially among true mycetophagous forms to the bruchoid type in the phytophagous *Anister*.

Other anthophagous Nitidulidae:

1. Subfamily Epuraeinae.

Complete anthophagy is recorded for some representatives of at least 3 genera of this subfamily (*Epuraea, Propetes = Amystrops* syn. n. = *Platychoropsis* syn. n. and *Grouvellia*), though this feature can be expected among many forms with unstudied bionomy having an appearance which gives reason for such an assumption. Imagines of many others visit flowers being obliged to or regularly.

2. Subfamily Carpophilinae.

Many adults visit flowers, and in some cases the pollination of the plants with participation of some species of this subfamily is recorded. The species of genus *Nitops* stat. n. and in particular Nearctic and (?) Neotropical *Urocarpolus* subgen. n., as well as Nearctic and Neotropical subgenera *Caplothorax* subgen. n. and *Plapennipolus* subgen. n. of genus *Carpophilus* are connected with flowers in both active stages of their living circle.

3. Subfamily Meligethinae

All adults and larvae of all species of this subfamily subendemic for the Old World with known biology live and feed in flowers of the angiosperm plants (mainly dicotylodons). This group is rather monogenous in the structural, ecological and bionomical aspects of all adaptive tendencies of anthophagization.

4. Subfamily Nitidulinae

This subfamily includes 5 groups where a trophic transition from primary mycetophagy to anthophagy and phyllophagy has occurred or is happening now. The recent representatives of the genus *Perilopsis* known from Chile, Australia and New Guinea

seem partly to preserve an ancient connection with the male cones of the gymnosperm *Araucaria* and *Agathis*, though the Chilean species (*P. flava* (Reitter, 1873), non Kirejtshuk, 1986b) lives in *Nothofagus* inflorescence. Structures of small bodies of the *Perilopsis* larva and imago are scarcely modified in comparison with those of other groups in the Nitidula-lineage represented by the forms sharing a complete mycetophagy.

Anthophagization in the *Aethina*-complex of genera has been considered above.

The third group of the Nitidulinae with an expressed anthophagization is the tribe Cychramini. Regarding almost a world-wide occurrence of the *Cychramus* species, an early origin of this genus can be admitted. The known larvae of these species breed in fungi, but imagines, at least in the Holarctic, Australian and Neotropical regions, are more or less regular visitors of flowers. Species of other genera of this tribe with known bionomy have a rather small body and are larval miners and imaginal feeders on flowers (mainly pollen) of the Brassicaceae (*Xenostrongylus, Oxystrongylus, Strongyllodes*). The mining larvae of *Xenostrongylus* have a considerable resemblance to the meligethine larvae, but their mandibles with strong teeth along inner edge and an obsolete molar look more similar to those in the Chrysomeloidea and Curculionoidea than to those in other Nitidulidae.

The Neotropical tribe Mystropini includes some genera (*Mystrops, Cychropiestus, Platychorodes*). All species of *Mystrops* with known bionomy live in palm inflorescences. Imaginal structures of the above mentioned genera are rather similar and give evidence for supposing at least imaginal anthophagy for these groups. Body size of most representatives of this tribe does not exceed 3.5 mm (only the imaginal body of *Cychropiestus corvinus* with mandibles reaches to 7.0 mm). Imaginal structures of head with appendages and abdominal apex have some resemblance to those in the Meligethinae, but the imaginal mandible is quite similar to that in some Chrysomeloidea, in particular among anthophilous forms. On the other hand, the larval legs of the *Mystrops* species as well as those in the Meligethinae, *Xenostrongylus* and predaceous Cybocephalinae have a characteristic adoral vesicle at the apex of the last segment of their legs. Emergence of this tribe, perhaps, took place comparatively not so long ago, i.e. after separation of South America from other continents of the Southern Hemisphere.

As a fifth group in the Nitidulinae, in which a process like anthophagization can be traced, there is the genus *Camptodes* from the tribe Strongylini, species of which develop in the decaying *Opuntia* flowers in Central and South America.

5. Subfamily Cillaeinae

Many species from this subfamily are known as visitors of flowering plants and some of them live and breed in flowers during the larval period of their living cycle. Interconnections between the Cillaeinae and gymnosperm plants have scarcely a very ancient character. As a rule, the anthophagous forms have been recorded in the groups some species of which are connected with fungi. The members of genera *Macrostola* and *Selis* seem to be more or less specialized to inhabit flowers. Adaptive tendencies of anthophagization are not expressed in appearence of these species because of the recent appearance of their anthophagy. Many groups of the Cillaeinae prefer dead and decaying flowers and this preference is an additional evidence of the recent development of this feeding. Little-studied Cillaeinae of Hawaii need a parti-

cular consideration in aspect of anthophagization and phyllophagization which for now can be supported by the data from labels of museum specimens.

In contrast to the regions with temperate and subpolar climate in tropical and sub-tropical ecosystems it is possible to trace some relict interconnections of Nitidulids with gymnosperm cones and flowers. Many anthophagous Nitidulid groups show a tendency to become more similar to other anthophagous groups in comparison with the appearance of their probable closer relatives. Disparity in degree of larval diffe-rentiation and similar simplification of imaginal structures give a comparative evidence to ascertain level and age of anthophagization. Among the considered anthophagous groups a more or less ancient complete anthophagy can be recognized for the species of *Perilopsis, Anister* and some Cychramini from the Nitidulinae, and also for all representatives of the Meligethinae. The beginning of the anthophagiza-tion of these groups should be supposed near the Rubicon of the Mesozoic and Kainozoic eras. Anthophagization in some Epuraeinae, other genera of the *Aethina*-complex, the rest Cychramini and Mystropini from the Nitidulinae, perhaps, had a later start, could be in the Palaeogene. And species of the rest anthophagous groups of the Nitidulidae began to acquire this type of trophics even later.

On the other hand, in some tropical regions a situation of unususal abundance of unspecialized anthophagous forms (mainly from the Epuraeinae) has been found, particularly expressed on islands of the Polynesian region with comparatively recent faunistic complexes. The last peculiarity gives reason to suppose that the anthopha-gization of some Nitidulid groups is continuing till now involving new forms with a mycetophilous mode of life.

### Taxonomical comments

1. Taxonomical references given in the catalogues by A.H. Grouvelle (1913), are here omitted.

2. On the synonymy of *Propetes* Reitter, 1875, *Amystrops* Grouvelle, 1906 and *Platy-choropsis* Grouvelle, 1912/1913: The recent study of most described and many un-named species regarded in composition of the mentioned taxa makes evident that all of them belong to a group of probably close relatives connected, in known cases, with the *Pandanus* flowers. As to synonymy *Propetes* Reitter, 1873 and *Amystrops* Grouvelle, 1906 (type-species: *Amystrops modiglianii* Grouvelle, 1906, here design-ated), it was established due to study the type specimen of the first proposed by monotypy (i. e. *Epuraea nigripennis* Redtenbacher, 1867 — Lectotype, male, here designated and 3 paralectotypes — "Fidler, Ceyl, 860"; all specimens in Natural History Museum in Vienna) and thousands of representatives of the second taxon. After a more detailed consideration of a composition of true "*Propetes*" and "*Platy-choropsis*" in as wide scope as possible I could not find any clear character to distinguish these groups. Perhaps, if an indistinct difference in convexity of body between "*Propetes*" and "*Platychoropsis*" can be admitted, it is still necessary to revise all members of this group in order to recognise this as a diagnostic feature (perhaps, some of them were described by L. R. Gillogly (1982) among *Haptoncus* Murray, 1864). Moreover, *Propetes seychelensis* sp. n. looks more like some species

from Australia and Polynesia than Indo-Malayan ones, while *P. aquilus* sp. n. has some features which put it apart from all other forms of the group. It can be supposed that the Epuraea group here united in *Propetes* is in a sense analogous with the Neotropical anthophagous *Mystrops* from the Nitidulinae connected with palm inflorescences. The Afro-Madagascarean Meligethinae also connected with inflorescences of palms (Endrödy-Younga 1978) can be considered as another anologous group. The genus *Propetes* consists of a great number of species while other seemingly anthophagous genera and subgenera of the Epuraeinae are monotypic or represented by a few species (*Apria* Grouvelle, 1919; *Parepuraea* Jelinek, 1977; *Grouvellia* Kirejtshuk, 1984; *Baloghmena* Kirejtshuk, 1987; *Polinexa* Kirejtshuk, 1989b; *Ceratomedia* Kirejtshuk, 1990a; *Mystronoma* Kirejtshuk, 1990a, etc.). Though among the largest groups of the subfamily with a mainly mycetophilous mode of life (*Epuraea* Erichson, 1843; *Haptoncus* Murray, 1864; *Micrurula* Reitter, 1884) some representatives became anthophagous as well. In order to show a scope of structural variability of the considered group 4 aberrant forms are here described, but for two of them a new subgeneric taxon is proposed. The phylogenetic relations of the *Propetes* proposed for *Platychropsis* (Kirejtshuk 1986b) remain acceptable for this united group and according to the opinion formerly published the links of this group with some groups of *Haptoncus* Murray, 1864 can be expected; *Tetrisus* Murray, 1864 = *Trimenus* Murray, 1864, *Tritesus* Heller, 1916 and *Baloghmena* Kirejtshuk, 1987.

The following synonymy can be summarized: *Propetes* Reitter, 1875 (= *Amystrops* Grouvelle, 1906, syn. n.; *Platychorinus* Grouvelle, 1906; *Platychoropsis* Grouvelle, 1912/1913, syn. n.; *Haptoncognathus* Gillogly, 1962 - see Grouvelle 1913 and Kirejtshuk 1986b).

3. *Propetes* (*Propetes*) *aquilus* Kirejtshuk, sp. n. — figs 2—12.

Specimens examined — Holotype, male and 53 Paratypes — "E slope Mt. McKinley, Danao Province, MINDANAO, 15: VIII; 46", "CNHM. Philippine Zool. Exped. (1946—47), H. Hoogstraal & D. Heynemann leg", "El. 3200—4200", "in leaf axils on climbing *Pandanus*" (holotype and most paratypes are deposited in the Field Museum of Natural History in Chicago, some paratypes in the Zoological Institute of the Russian Academy of Sciences and the Zoological Research Institute and Museum Alexander Koenig in Bonn).

Male, holotype. Length with mandibles 5.0 (and without 4.3), breadth 2.1, height 1.0 mm. Rather convex dorsally and slightly — ventrally; dorsum dark reddish brown with nearly black mandibles; ventral surface and appendages (except mandibles) reddish, though metepisterna, epipleura and ventrites somewhat darker; dorsum almost dull, but ventral surface almost with a moderate shine; body covered with fine, subrecumbent, moderately conspicuous, greyish golden hairs, length of which about 2.5 times more than the distance between their roots on dorsum; anal sclerite with a brush of long hairs at apex.

Head, pronotal and scutellar surface with punctures 1.5—2.0 times as large as eye facets, smaller on head and becoming larger to pronotal base, interspaces between them about a puncture diameter and narrower at pronotal base, nearly alutaceous. Elytral surface somewhat as that on head and pronotum, but with punctures at base larger and denser. Surface of pygidium, preceding tergite and
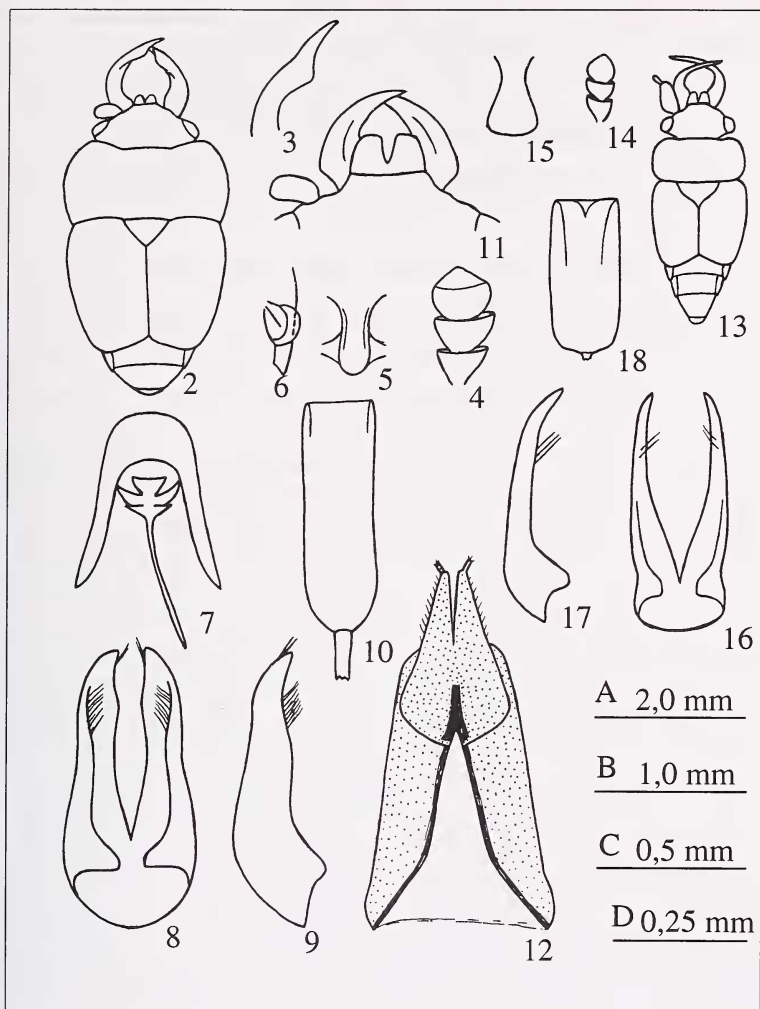
Figs 2—18: *Propetes* (*Propetes*) spp. — *P.* (*P.*) *aquilus* sp. n. (2—12): male (holotype: 2 — body from above; 3 — apex of left mandible, fronto-dorsal; 4 — antennal club; 5 — medial part of prosternum with process, ventral; 6 — idem, lateral; 7 — anal sclerite, ventral plate and spicula gastrale, ventral; 8 — tegmen, ventral; 9 — idem, lateral; 10 — penis, dorsal; female: 11 — fore part of head with mandibles, dorsal; 12 — ovipositor, ventral; *P.* (*P.*) *seychellensis* sp. n. (13—18): male (paratype): 13 — body from above; 14 — antennal club; 15 — prosternal process, ventral; 16 — tegmen, ventral; 17 — idem, lateral; 18 — penis, dorsal. Scales: A — to figs 2, 13; B — to figs 5, 6; C — to figs 4, 7, 11, 14, 15; D — to figs 8—10, 12, 16—18.

ventrites with small punctures about as large as eye facets, interspaces between them less or up to a puncture diameter, finely and distinctly microreticulated. Surface of metasternum with sparse punctures, somewhat larger than eye facets, interspaces 2—3 puncture diameters, smoothedly microreticulated. Prosternal surface with very

small and sparse punctures, with very fine and dense undulate microreticulation. Head more than twice shorter than the distance between eyes which consist of rather small facets, with elevated antennal insertions and a wide depression between them. Mandibles with a blunt process before acute apices. Labrum with a deep and wide excision between lobes. Antennae with long and dense hairs, much longer than head broad overreaching pronotal base, their club composing a fourth of total antennal length. Pronotum with a narrow border along perimeter (obsolete in the middle of fore edge), slightly excavated fore and hind edges, and sides gently sloping to extremely narrowly explanate lateral edges. Elytra with arched lateral and oblique apical edges, their sides steeply sloping to extremely narrowly explanate lateral edges. Elytral apices leave pygidium and preceding tergite uncovered. Pygidium with a truncate apex, under which a widely rounded apex of anal sclerite exposed. Terminal segment of maxillar and labial palpi rather long, although of usual structure. Antennal grooves scarcely expressed at arched sides of mentum. Prosternum flattened, its process scarcely medially curved and with a vertically abrupt and rather narrow apex. The distance between mid coxae subequal and that between hind ones about twice more than that between fore coxae. Mesosternum deeply excavated and with a well raised but not sharp medial ridge. Metasternum flattened, with medial suture well expressed nearly along the entire length, angularly excised hind edge between coxae, a well raised intercoxal line between mid coxae and caudal marginal lines behind mid coxae closely following hind edge of coxal cavities. 1st ventrite longest and without a trace of caudal marginal lines behind coxae. Hypopygidium with a nearly truncate or slightly bisinuate apex. Epipleura at base a little narrower than antennal club. Legs moderately raised. Tibiae comparatively short and subequal, nearly as long as prosternum and its process combined, somewhat narrower than antennal club, but a little wider than prosternal process: fore one finely crenulate along outer edge and with a strong subapical tooth curved ventrally; mid and hind ones with long hairs, particularly conspicuous in two rows along their outer edge, and a few subapical stout thorns. Femora with usual outlines of gently convex fore and hind edges: fore and mid ones about 1 and $2/3$, but hind ones more than twice as wide as corresponding tibiae. Fore tarsi as wide as fore tibiae, mid and hind ones much narrower, claws moderately long and toothed at base. Tegmen well and penis trunk moderately sclerotized.

Female. Externally differs from the male by more or less smaller prothorax and head, flattened surface of head, normally developed mandibles, shorter antennae with moderately raised scapus, less raised medial ridge on mesosternum, moderately rounded pygidial and widely rounded hypopygidial apices. Ovipositor with usual sclerotization.

Variations. Minimal length with mandibles 2.7, but maximal one as that of the holotype (with mandibles 5.0 and without 4.3), breadth 1.4−2.5, height 0.8−1.0 mm. Sexual dimorphism is scarcely exhibited in the smallest males which differ from the females mainly by a little longer antennae as well as apices of pygidium and hypopygidium. The same holds true for the medial ridge on mesosternum which is well developed in larger males and rather weakened in smaller ones. A certain variability is expressed in coloration, punctuation, sculpture and pubescence.

Notes. *P.* (*P.*) *aquilus* sp. n. differs from all other members of the genus by comparatively large and robust body, particularly by its unicoloured dark dorsum, a well raised medial ridge of male mesosternum and also by a combination of features in punctuation, sculpture and pubescence of body sclerites. Besides that, this new species shows a resemblance with species of *Mandipetes* subgen. n. in having of a narrow prosternal process as well as expressed intercoxal line between mid coxae and caudal marginal lines behind mid coxae. Finally, its toothed tarsal claws are also enough diagnostic for this new species among the consubgeners. According to the labels pinned under the studied specimens they have been collected as well as those of *P.* (*Mandipetes*) *longipes* subgen. et sp. n. "in leaf axils", though attendance of these species in inflorescences of *Pandanus* for feeding and larval development is more probable in comparison with a possibility of their links with leaves or fungi seemingly growing in wet sites on vegetative organs of Pandanus.

4. *Propetes* (*Propetes*) *seychellensis* Kirejtshuk, sp. n. — figs 13—18.

Specimens examined — Holotype, male and 1 paratype, male "Seych., Mahé', Mare aux cochous, 15. 12. 1992, Malicky" (holotype is deposited in Natural History Museum in Vienna and paratype — Zoological Institute of Russian Academy of Sciences).

Male, holotype. Length with mandibles 4.0 (and without 3.5), breadth 1.4, height 0.6 mm. Weakly convex dorsally and ventrally; straw coloured with black eyes; body with a faint shine, partly almost dull; thoracic segments and elytra with very fine, subrecumbent, scarcely conspicuous hairs, length of which about the distance between their roots on elytra, but tergites uncovered by elytra and ventrites with denser and more conspicuous yellowish pubescence; anal sclerite with 4, hind edge of hypopygidium with some and other sclerites of abdomen with a few rather long and thick reddish setae.

Head surface with distinct punctures a little larger than eye facets, interspaces between them a little more or less than a puncture diameter, nearly alutaceous, especially at base. Surface of pronotum, elytra and metasternum somewhat as that on head, but with punctures somewhat larger, interspaces between them 2—3 puncture diameters, with dense, cellular and partly smoothed microreticulation. Surface of pygidium, preceding tergites and ventrites with punctures about twice smaller than eye facets, interspaces between them approximately as those on head surface, finely and densely microreticulated. Prosternal surface with very small, scarcely visible and sparse punctures, with very fine and dense undulate microreticulation. Head more than twice as short as the distance between eyes consisting of comparatively large facets, with rather elevated antennal insertions and a wide and shallow depression between them. Besides it, a medial "endocarina" is traced in basal half. Mandibles rather narrow and long with simple acute apices strongly curved almost turning backwards. Labrum with a deep and wide excision between lobes. Antennae with rather long hairs, reach scutellar apex, their scapus much bigger than their club (nearly as long as the distance between antennal insertions), their club composing about a fifth of total antennal length. Pronotum widest at fore half and almost bisinuate at base, with a narrow border along perimeter, almost convex fore

and hind edges, disk flattened and sides comparatively steeply sloping to unexplanate lateral edges. Elytra with arcuate lateral and oblique apical edges, their sides steeply sloping and a little curving ventrally at unexplanate lateral edges. Elytral apices leave pygidium and 2 preceding tergites uncovered. Pygidium with a truncate apex, under which a widely rounded apex of anal sclerite is exposed. Terminal segment of maxillar and labial palpi rather long, but of usual structure. Antennal grooves completely untraced at arched sides of mentum which slightly more than twice as wide as long. Prosternum flattened, its process medially somewhat curved and widened before flat and widely rounded apex. The distance between mid coxae twice than that between fore ones and a little less than that between hind coxae. Mesosternum shallowly excavated and without any carina along the middle. Metasternum flattened, with medial suture well expressed nearly along the entire length, shallowly archedly emarginate hind edge between coxae, without a trace of intercoxal line between mid coxae and caudal marginal lines behind mid coxae. 1st ventrite longest and without a trace of caudal marginal lines behind coxae. Hypopygidium with a widely rounded hind edge. Legs moderately raised. Tibiae comparatively short and subequal, nearly as long as prosternum with process, much wider than antennal club, but a little narrower than prosternal process: fore one finely crenulate along outer edge and with 2 strong subapical teeth; mid and hind ones with long hairs, particularly conspicuous in two rows along their outer edge and 1−2 strong subapical spines. Femora with usual outlines of gently convex fore and hind edges, fore and mid ones about 1 and $^2/_3$, but hind ones more than twice as wide as corresponding tibiae. Fore tarsi about $^2/_3$ width of fore tibiae, mid and hind ones significantly narrower, claws moderately long and simple. Tegmen well and penis trunk moderately sclerotized.

Variation. Length with mandibles 3.1 (and without 2.7), breadth 1.2 mm. The second studied specimen (paratype) has smaller head less convex at base, somewhat narrower pronotum, less raised mandibles and antennae.

Notes. *P. seychellensis* sp. n. has some more resemblance to the species described by L. R. Gillogly (1962) in the *Haptoncognathus* as well as to *P. puberulus* (Kirejtshuk 1986b), comb. n. and *P. subcalvus* (Kirejtshuk 1986b), comb. n. (both described as *Platychoropsis*). This new species is characterized by a rather short head without bulbed temples, but with extremely curved mandibles and rather enlarged antennal scapi, a wide and comparatively short pronotum with straight, almost convex fore edge and gently rounded hind corners and also rather sparse dorsal punctuation. This combination of characters allows to determine it from the species given in the key elaborated by A.G.Kirejtshuk (1986b). Moreover, a traced medial "endocarina" is unknown among other representatitives of the family at all.

5. *Mandipetes* Kirejtshuk, subgen. n. Type species: *Propetes* (*Mandipetes*) *longipes* subgen. et sp. n. Includes also *P.* (*M.*) *intritus* subgen. et sp. n. As yet recorded from Vietnam and Philippine islands.

Notes. This group is quite distinct from *Propetes* s. str. mainly by the characters of the structure of mouth parts and some others mentioned below. As both species here included in *Mandipetes* subgen. n. share a more or less stable combination of derived features, a separate taxon seems advisable.

*Propetes* s . s t r .: (1) mandibles, if long, with a simple apex or, if short, with a small subapical tooth, although in a few cases (*P.* (*P.*) *pacificus* Gillogly, 1962, comb. n.) with apices represented by two long teeth; (2) mentum with usual shape and proportion, composed of a small or medium part of ventral surface of epicranium; (3) maxillar lobe and palpus comparatively long, but of usual structure; (4) sides of pronotum unnarrowed to its base forming acute apices of hind corners, or gently narrowed with widely rounded apices, and infrequently with a configuration as that in *Mandipetes* subgen. n., fore edge of pronotum usually with complete or rarely with obsolete carina; (5) legs of medium sizes, tibiae moderately widened apically;

*Mandipetes* s u b g e n . n .: (1) mandibular apex with two long teeth; (2) mentum rather enlarged and subquadrangular, composed of more than half of ventral surface of epicranium; (3) maxillar lobe very narrow and long with setae posteriorly oriented along its inner edge, and palpus very long, with ultimate and penultimate segments dilated at apices and with setae posteriorly oriented along its inner edge; (4) sides of pronotum narrowed as anteriorly as posteriorly and its hind corners with angular blunt apices, fore edge of pronotum with obsolete carina; (5) legs comparatively long and very narrow.

R e m a r k s   o n   b i o n o m y. General shape and peculiarities of mouth parts, antennae and legs, including wide lobes of 1—3 tarsomeres give an evidence on anthophagous mode of life for at least imagines of *P. longipes* sp. n. It should be supposed that both species of *Mandipetes* subgen. n. are associated with *Pandanus* inflorescences as other species of the genus (subgenus *Propetes* s.str.).
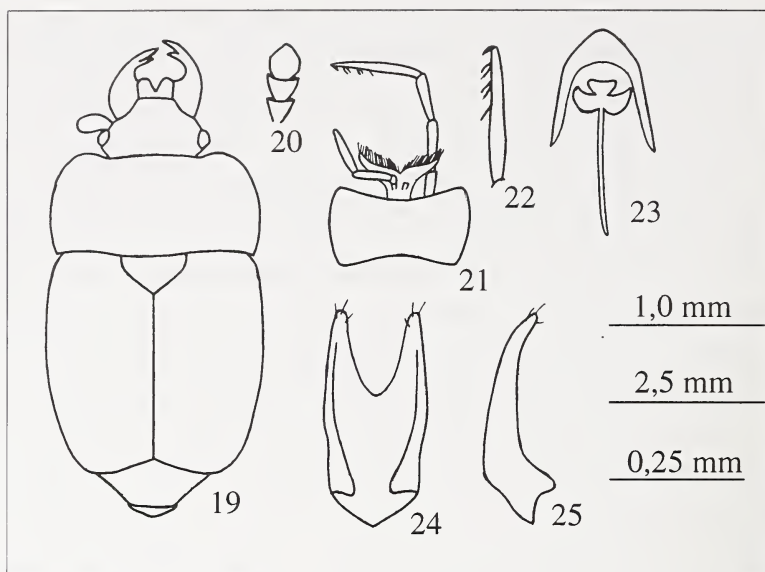
6. *Propetes* (*Mandipetes*) *intritus* Kirejtshuk, subgen. et sp. n. — figs 19—25.

S p e c i m e n s   e x a m i n e d — Holotype, male — "Vietnam, Tam Dao, Son Zuong, hills in valley, 21. II. 1962, O.Kabakov" (in Cyrillic letters) (holotype is deposited in Zoological Institute of Russian Academy of Sciences).

M a l e, holotype. Length with mandibles 2.8 (and without 2.5), breadth 1.5, height 0.7 mm. Moderately convex dorsally and ventrally; bright reddish with somewhat darkened pronotum, thoracic sterna and 1—3 ventrites, and with chestnut brown elytra; body with a particularly bright shine; dorsum with extremely fine, scarcely visible, very short hairs; vertral surface with slightly conspicuous yellowish hairs, length of which somewhat less than the distance between their roots on ventrites.

Head, pronotal, scutellar and elytral surface with distinct punctures about 1.5 times as large as eye facets, interspaces between them 2.0—3.5 puncture diameters (a little narrower on elytra), completely smooth. Pygidial surface with not quite distinct punctures a little larger than eye facets, interspaces between them somewhat more than a puncture diameter, densely and conspicuously microreticulated. Surface of metasternum and 1st ventrite with sparse distinct punctures, somewhat smaller than on dorsum, interspaces 1.5—2.5 puncture diameters, smooth, but surface of 2—5 ventrites with smaller and denser punctures and with a trace of microreticulation more expressed posteriorly. Prosternal surface with rather small punctures smaller than eye facets, interspaces between them with very fine and smoothed microreticulation. Head about 1.5 times shorter than the distance between eyes which consist of medium facets, weakly convex and with a shallow depression between slightly elevated antennal insertions. Mandibles with a sharp process before acute apices.

Figs 19—25: *Propetes* (*Mandipetes*) *intritus* sp. n., male, holotype: 19 — body from above; 20 — antennal club; 21 — mentum with maxillar and labial palpi, ventral; 22 — last segment of maxillar palpi; 23 — anal sclerite, ventral; 24 — tegmen, ventral; 25 — idem, lateral. Scales: A — to fig. 19; B — to figs 20, 21, 23; C — 24, 25.

Labrum with a deep and wide excision between lobes. Antennae no longer than head broad, their club very narrow and composing about $2/7$ total antennal length. Pronotum with a narrow border along its perimeter (obsolete in the middle of fore edge), excavated fore and slightly emarginate hind edges, and sides gently sloping to unexplanate lateral edges. Elytra with arcuate lateral and oblique apical edges, their sides steeply sloping to bordered but not explanate lateral edges. Elytral apices leave pygidium entirely uncovered. Pygidium with a truncate apex, from which a subangular apex of anal sclerite exposed. Terminal segment of maxillar palpi very long with curved apex and a row of setae along its inner side. Terminal segment of labial palpi rather long and thin, though of usual structure. Antennal grooves scarcely expressed at sides of subquadrangular mentum which twice as wide as long and with emarginate fore edge. Prosternum flattened, its process scarcely medially curved and subparallel at sides, with vertically abrupt apex a little narrower than antennal club. The distance between mid coxae 1.5 times and that between hind ones 3.0 times more than that between fore coxae. Mesosternum deeply excavated and with a weak medial carina. Metasternum slightly convex, with a medial suture well expressed along the distal $2/3$, archedly emarginate hind edge between coxae, a well raised intercoxal line between mid coxae and caudal marginal lines behind mid coxae closely following hind edge of coxal cavities. 1st ventrite longest and without a trace of caudal marginal lines behind coxae. Hypopygidium a little shorter than 1st ventrite with a nearly truncate or slightly bisinuate apex. Legs with a moderate length, but comparatively

narrow. Tibiae short and subequal, somewhat longer than prosternum and its process combined, nearly as wide as prosternal process: fore one finely crenulate along outer edge and with a medium subapical tooth; mid and hind ones with moderately long hairs, partly disposed in two rows along their outer edge. Femora with usual outlines of gently convex fore and hind edges: fore and mid ones about 1 and $^2/_3$; but hind ones more than twice as wide as corresponding tibiae. Fore tarsi $^2/_3$ as wide as fore tibiae, mid and hind ones much narrower, claws moderately long and toothed at base. Tegmen moderately and penis trunk weakly sclerotized.

N o t e s . This new species differs from another known member of the subgenus, except aedeagal structures, by smaller body, wide base of male mandibles with a setae row along their basal part only, narrower and compact antennal club composing $^2/_7$ total antennal length, the distance between mid coxae subequal with width of antennal club, tibiae about as long as prosternum and its process combined, toothed claws. On the other hand, P. (M.) intritus subgen. et sp. n. has an appearance somewhat similar to P. (P.) nigripennis (Redtenbacher, 1867) and some other Indo-Malayan species from Propetes s.str., however, the body of this new species has a particularly bright shine and strongly reduced pubescence, distinctive pronotum archedly narrowed anteriorly as well as posteriorly, comparatively narrow antennal club, structure of male maxillar palpi, longer and narrower labial palpi, large mentum, narrower legs and toothed tarsal claws. The characters of this new species partly correspond with the description of Propetes bicolor (Grouvelle, 1910), comb. n. (a species still unknown to me), but is formally distinguishable from the latter by its shiny body with reduced pubescence and the shape of the pronotum (pronotum of P. bicolor comb. n. with emarginate fore edge, "angulis rotundatis" fore and backwards with projected hind corners).

7. Propetes (Mandipetes) longipes Kiretshuk, subgen. et sp. n. — figs 26—37.

S p e c i m e n s e x a m i n e d — Holotype, male and 1 paratype: "E. slope Mt. McKinley, Davao Prov., MINDANAO, 24 Sept.: 46", "Elev.: 3300 ft", "CNHM Philippine Zool. Exped. (1946—47), H. Hoogstraal & D. Heynemann leg"; 6 paratypes: ibid. "... IX:1:46", "in leaf axils of climbing Pandanus", "elev. 3000 ft", "CNHM Philippine Zool. Exped. (1946—47), H. Hoogstraal & D. Heynemann leg" (holotype and 4 paratypes are deposited in the Field Museum of Natural History in Chicago and the remaining paratypes in the Zoological Institute of Russian Academy of Sciences.

M a l e , holotype. Length with mandibles 5.5 (and without 4.6), breadth 2.2, height 1.0 mm. Moderately convex dorsally and ventrally; bright reddish with black elytra; rather shiny; dorsum with sparse, long, subrecumbent and quite conspicuous yellowish hairs, length of which is nearly 5 times more than the distance between punctures; ventral surface with very short and slightly conspicuous pubescence.

Head and pronotal surface with punctures as large as eye facets, interspaces between them 2—4 puncture diameters (and less at pronotal sides and base), smooth. Elytral surface with somewhat larger and denser punctures than those on head and pronotum, interspaces between them with a trace of alutation. Surface of tergites uncovered by elytra and prosternum with very small, not quite distinct and moderately dense punctures and cellularly microreticulated interspaces between them. Surface of ventrites and metasternum with less distinct punctures than on head,

pronotum and elytra which are somewhat smaller than eye facets, interspaces between them 1—2 puncture diameters on ventrites and 3—4 puncture diameters on metasternum, nearly as reticulated as that on pygidium and prosternum. Head 1.5 times shorter than the distance between eyes, composed of moderately small facets, and strongly concave between antennal insertions. Antennae a little longer than head broad, with 3-segmented club. Mandibles with 2 processes along inner edge and densely haired along inner ridge of their ventral surface. Labrum with deeply and widely separate lobes. Maxillar palpi with very long penultimate and ultimate segments widened at apex and densely haired along inner edge. Mentum very large and rather projected anteriorly. Pronotum with slightly and evenly convex surface and obsolete fore edge at neck. Elytra steeply sloping to narrowly bordered lateral edges and transverse apices, remaining pygidium and a part of preceding tergite uncovered. Exposed tergites and anal sclerite well sclerotized and rather convex. Antennal grooves on ventral side of epicranium unexpressed. Prosternum slightly convex with a narrow process slightly medially curved and vertically abrupt at apex. The distance between mid coxae about twice less, but that between hind ones twice more than the distance between fore coxae. Mesosternum deeply excavated and slightly convex at bottom. Metasternum flattened, with a well raised medial suture and a subangular emargination of hind edge between coxae. Hypopygidium almost 1.5 times longer than 1st ventrite and nearly with a transverse apex. Legs narrow, long and rather simplified. Tibiae somewhat narrower than antennal club: fore one finely crenulate, mid and hind — with 2 longitudinal rows of dense, thin and short hairs along their outer edge. Femora with usual outlines of gently convex fore and hind edges, more than twice as wide as tibiae. Fore tarsi somewhat wider, but mid and hind ones somewhat narrower than the corresponding tibiae, with moderately raised claws slightly toothed at base. Aedeagus well sclerotized.

F e m a l e. Externally differs from male by less wide fore edge of pronotum and head, different antennal club, suberected mandibles with less projected inner processes, much shorter penultimate and ultimate segments of maxillar and labial palpi, mentum less projected anteriorly, prosternal process more curved medially and with sloping edges, a little shorter legs, widely rounded or nearly subangulate pygidial apex and gently rounded hypopygidial apex. Ovipositor well sclerotized.

V a r i a t i o n. Length with mandibles 4.4—5.5 (and without 4.0—4.6) mm. Pronotal disk of some paratypes more or less darkened. The second studied male (paratype) has in contrast with the holotype more arched pronotal sides, somewhat smaller head, different configuration of mandibles and prosternal process nearly as in females. Some variations are expressed in punctuation and sculpture of surface.

N o t e s. P. (M.) *longipes* sp. n. differs from another consubgener here described, except aedeagal structures, by larger body, much longer mandibles (particularly in males) with a narrower base and a row of setae along entire inner edge to base of a long subapical tooth, antennal club with loose articles, composing a fourth of total antennal length, distance between mid coxae considerably less than width of antennal club, tibiae much longer than prosternum and its process combined, comparatively long hypopygidium, almost simple tarsal claws. This new species is easily distinguishable from all the *Propetes* species by larger head with very wide fore edge and highly specialized characteristic mouth parts, shape of pronotum, convex
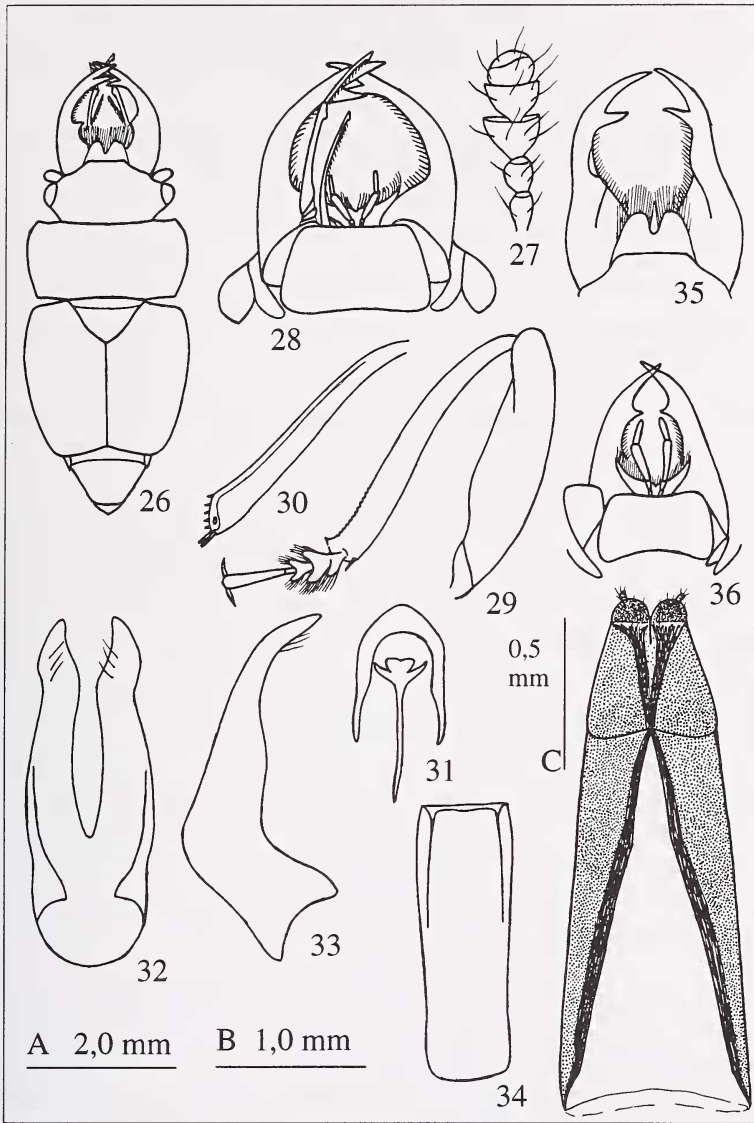
Figs 26—37: *Propetes* (*Mandipetes*) *longipes* subgen. et sp. n. Male, holotype: 26 — body from above; 27 — antennal club; 28 — ventral surface of head; 29 — fore leg, dorsal; 30 — mid tibia, dorsal; 31 — anal sclerite, ventral plate and spicula gastrale, ventral; 32 — tegmen, ventral; 33 — idem, lateral; 34 — penis trunk, dorsal; male, paratype: 35 — fore part of head with mandibles, dorsal; female: 36 — ventral surface of head; 37 — ovipositor, ventral. Scales: A — to figs 26; B — to figs 27—31, 35, 36; C — to figs 32—34, 37.

and long male anal sclerite, narrow and vertically abrupt prosternal process, long and narrow legs, comparatively long hypopygidium, genitalia of both sexes.

8. *Caplothorax* Kirejtshuk, subgen. n. Type species: *Carpophilus melanopterus* Erichson, 1843. Includes type-species, *Carpophilus rufus* Murray, 1864, and some still undescribed species from the Neotropical region. Nearctic and Neotropical distribution.

Notes. The species of this subgenus are characterized by appearance partly similar to the species of *Urocarpolus* subgen. n. (perhaps, as a result of convergent evolution of anthophilous mode of life in both groups), but with male anal sclerite and genitalia of both sexes as those in other groups of the genus *Carpophilus*, but not as in the species of *Nitops* stat. n. Acute pronotal corners of the *Caplothorax* subgen. n. are very distinctive from those in other anthophagous forms from the two genera *Carpophilus* and *Nitops* stat. n. The new subgenus seems to have some relationship to subgenus *Megacarpolus* Reitter, 1919 in which some species from the New World should be included, but differs from it by more convex and oval body, peculiarities of sexual dimorphism and aedeagal structures as well as mode of life of its members. On the other hand, species of the *Caplothorax* subgen. n. seem to be related to those of *Plapennipolus* subgen. n., but much more convex and dull because of strongly contrasting microreticulation, and with compact and wide antennal club. Finally, the species of the *Caplothorax* subgen. n. has also some resemblance to the Papuan *Carpophilus* (*Loriarulus*) *poggii* Kirejtshuk, 1987 with unknown bionomy (including acute pronotal corners), but differs from the latter by much shorter last abdominal segment with a simple apex in female and convex dorsum. Perhaps, three subgenera (*Loriarulus* Kirejtshuk, 1987, *Caplothorax* subgen. n., *Plapennipolus* subgen. n.) have their phyletic roots among an ancestor group very close to the *Megacarpolus* species of which for now maintain a more plesiotypic appearance and mycetophilous mode of life. The Nearctic *Carpophilus longus* Fall, 1910 seemingly connected with flowers of *Yucca* has an unclear position between *Caplothorax* subgen. n. and *Plapennipolus* subgen. n., though very different from both by rather slender body and *Myothorax*-like pronotum with long-fringed sides.

9. *Plapennipolus* Kirejtshuk, subgen. n. Type species: *Colastus yuccae* Crotch, 1874. Includes also ? *Carpophilus rufiventris* Schaeffer, 1911. Endemic Nearctic distribution.

Notes. This new subgenus is characterized a particularly flattened dorsally and ventrally body with rather wide elytra and abdomen (external appearance to some of *Colopterus* species from the Cillaeinae) and more loose and elongate antennal club in contrast with the member of *Caplothorax* subgen. n. and *Megacarpolus* (seemingly related to this subgenus). Its position has been regarded above in the consideration of *Caplothorax* subgen. n. and will be discussed more detailed in one of the further papers.

10. Genus *Nitops* Murray, 1864, stat. n. Type-species: *Carpophilus* (*Nitops*) *ophthalmicus* Murray, 1864. Composition (besides type-species) is referred to in Grouvelle (1913) and Dobson (1972); a group of species included here in *Urocarpolus* subgen. n. should also be inclued in genus *Nitops*. The taxa *Nitops* and *Endomerus* proposed by Murray (1864) were regarded as synonyms by some authors (Sharp 1887—1905; Grouvelle 1913; Junk's catalogue and others). In this paper the tradition is tentatively continued until a more detailed revision of this group is available.

Notes. This genus in contrast with all other groups of the Carpophilinae is characterized by unexcised hypopygidial and abruptly transverse pygidial apices in males, forming together a round foramen for the apically projected anal sclerite. Only one species of the Carpophilinae known from Himalalya and Indochina (*Urophorus* (*Anophorus*) *prodicus* Hinton, 1944) has a similar abdominal structure, i.e. male hypopygidium of this species without the depression characteristic for *Anophorus* Kirejtshuk, 1990b, but distinctly and widely emarginate at apex. As structure of genital capsule and aedeagus in both mentioned cases is a derived character, a secondary (? reversal) and independent development of the last abdominal segment can be admitted for both species of *Nitops* stat. et sensu n. and *U.* (*A.*) *prodicus*. The groups of species here regarded as subgenera of *Nitops* stat. et sensu n. are characterized also by a compact 3-segmented antennal club with the largest ultimate segment (most of the members of *Carpophilus* have 9th segment partly loose from consolidated 10th and 11th ones). Besides that, the species of *Nitops* stat. et sensu n. differ from all groups of the subfamily, having strongly convergent antennal grooves and very large eyes composed of comparatively large facets, as well as a highly specialized structure of ovipositor. The species of both subgenera of the considered genus according to the labels attached to museum specimens are usual visitors of flowers of the angiosperms and Connell (1956) had recorded the development of larvae *N.* (*U.*) *floralis* comb. n. in flowers of *Opuntia opuntia*.

11. *Urocarpolus* Kirejtshuk, subgen. n. Type species: *Cercus pallipennis* Say, 1823. Other species in this subgenus: *Carpophilus floralis* Erichson, 1843; *Carpophilus mexicanus* Reitter, 1873 (? = *nigrovittatus* Parsons, 1943); *Carpophilus longiventris* Sharp, 1889; ? *Carpophilus obtusicollis* Reitter, 1873. Distributed in the Nearctic region and Mexico.

Notes. The subgenera of *Nitops* stat. et sensu n. can be diagnosed after the following features:

*Nitops* s. str.: (1) eyes very large and consisting of large facets, temples not raised; (2) antennal grooves strongly nearly rectilinearly convergent; (3) length of elytra subequal or usually more than their combined width; (4) female with a pygidial apex with rounded or subtruncated hind edge and a beetled process in the middle; (5) ovipositor wide with unnarrowed and unforked gonocoxites subtruncate at apex.

*Urocarpolus* subgen. n.: (1) eyes moderately large and consisting of moderately small facets, temples exposed behind them; (2) antennal grooves strongly curved and feebly convergent; (3) length of elytra considerably shorter than their combined width; (4) female pygidial apex subacute; (5) ovipositor with slightly modified sclerites of gonocoxites narrowed to the forked apex.

12. *Brounthina aequalis* Kirejtshuk, gen. et sp. n. — figs 38—46.

Specimens examined — Holotype, male: "sp.", "Mt. Owen, 26-2-14", "New Zealand, Broun Coll. 1922—482"; paratypes: 2 — "Glen Hope, 20-2-15", "New Zealand, Broun Coll. 1922—482"; 1 — "Pacuratani, 2-1-1915", "New Zealand, Broun Coll. 1922—482"; 2 — "New Zealand, Gollanz Valley, 1-II. 1924, in fungus, G. V. Hudson"; 1 — "New Zealand, Wallington, — II. 1924, in fungus, G. V. Hudson"; 2 — "NZ. Nelson Lakes N P., 2000', 28—30. V. 1976, O.Kukal"; 1 — "N. ZEAL., BR, Punakaiki, Porarari R., 29. XII—3. I. 1984, 35 m, L. Masner, Nothof., prim.

for."; 2 — "N. Zeal.; S. Isl., 30 km W Collingwood, Mangarakau, 50 m, 20. V. 82, S. & J. Peck, mixedforest litter"; 1 — ibid... "13 km NW Takara Washburn Res., 10 m, 19. V. 82, S. & J. Peck, beech log litter"; 2 — ibid... "BR. Nelson Lks. N. P., LK Rotoiti, St. Arnaud Track, 670 m, (14-XII-1984)—(6-I-1985)", "*Nothofagus* spp. for., log & leaf litter, A. Newton & M. Thayer"; 2 — ibid... "Mt. Robert Road, 660 m, (26-XII-1984)—(6-I-1985)", "*Leptospermum-Nothof.* scrub log & leaf litter, A. Newton & M. Thayer"; 1 — ibid... "N Slope Mt. Robert, Speargrass Tr., 880 m, (21-XII-1984)—(6-I-1985)", "*Nothofagus* spp. for., tree crotch litter, A. Newton & M. Thayer"; 1 — ibid... "SD, Tennyson Inlet, E Side Duncan Bay, 30 m, (15-XII-1984)—(5-I-1985)", "*Nothofagus* for. litter u. palm leaf litter, A. Newton & M. Thayer"; 1 — ibid... "SD, Tennyson In-let, W Side Te Mako Bay, 125 m, (15-XII-1984)—(5-I-1985)", "*Nothofagus*-podo-pdwd. log & leaf litter, A. Newton & M. Thayer"; 1 — ibid... "NN, Takara R., Cobb Dam., Asbestos For. Walk, 410 m, 2-I-1985", "*Nothofagus*-podo-pdwd. log & leaf litter, A. Newton & M. Thayer" (holotype and 4 paratypes are deposited in the Natural History Museum in London; other paratypes in Zoological Institute of Russian Academy of Sciences, Field Museum of Natural History in Chicago, Biosystematic Research Institute in Ottawa, Canadian Museum of Nature in Ottawa and Zoological Research Institute and Museum Alexander Koenig in Bonn).

M a l e, holotype. Length 4.3, breadth 2.1, height 1.0 mm. Moderately convex dorsally and slightly — ventrally; unicoloured reddish with slightly lighter mouth parts and legs; with a feeble shine; dorsum with moderately dense, long, sub-recumbent and contrasting conspicuous yellowish golden hairs, length of which is nearly 3 times more than the distance between their roots; ventral surface with somewhat short and finer, slightly conspicuous hairs, length of which about twice more than their roots; pronotal and elytral sides moderately ciliate.

Head and pronotal surface with punctures about 1.5 times as large as eye facets, interspaces between them nearly a third puncture diameter, densely and cellularly microreticulated. Elytral surface with shallower, smaller, more sparse and less distinct punctures than those on head and pronotum, interspaces between them larger, but as reticulated as those on head and pronotum. Pygidial surface densely and finely punctured, with narrow interspaces densely and cellularly reticulated. Surface of thoracic sterna and 1—4 ventrites with distinct punctures nearly as large as eye facets, interspaces between them 1.5—2.5 puncture diameters, smoothed or smooth on thoracic sterna and reticulated on ventrites. Hypopygidial surface similar to that on 1—4 ventrites, but punctures much larger and with narrower interspaces. Head 1.5 times shorter than the distance between eyes, composed of rather small facets, and concave between antennal insertions. Antennae a little shorter than head broad with 3-segmented and compact club. Mandibles moderately exposed from under frons and labral lobes deeply and widely separated. Maxillar and labial palpi with moderately developed segments, last ones of labial palpi slightly bulbous with oblique apex. Mentum pentangular 2.5 times as wide as long. Pronotum with slightly and evenly convex surface, with a narrow border along base and sides. Elytra steeply sloping to narrowly bordered sides and to acute apices, almost completely covered pygidium. Pygidial apex almost transverse and remaining uncovered angular apex of anal sclerite. Antennal grooves quite distinct and convergent along inner sides.
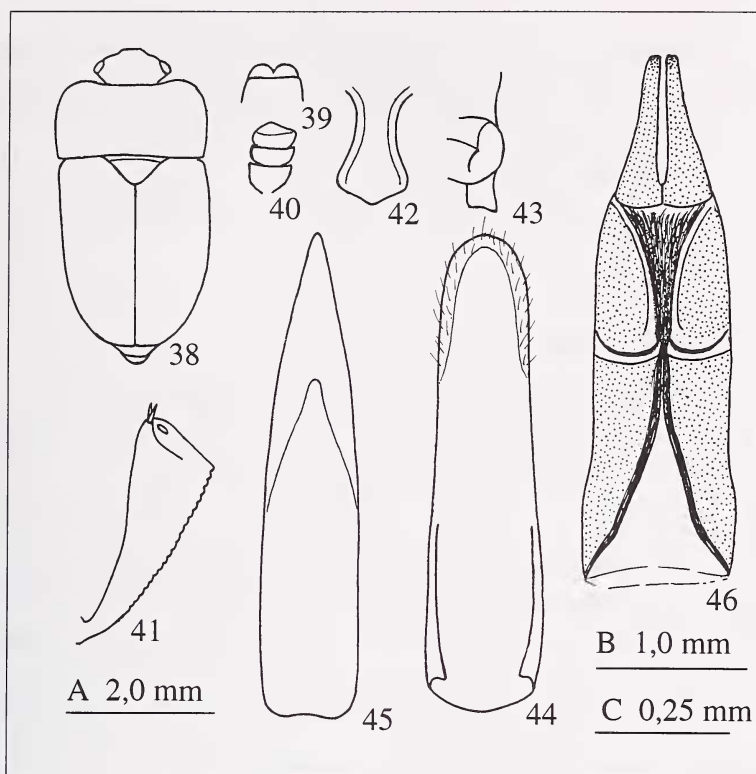
Figs 38−46: *Brounthina aequalis* gen. et sp. n. Male: 38 — body from above; 39 — fore part of head with labral lobes, dorsal; 40 — antennal club; 41 — fore tibia, dorsal; 42 — prosternal process, ventrally; 43 — idem, laterally; 44 — tegmen, ventral; 45 — penis trunk, dorsal; female: 46 — ovipositor, dorsal. Scales: A — to fig. 38; B — to figs 39−43; C — to figs 44−46.

Prosternum slightly convex with a process moderately medially curved and almost vertically abrupt at apex. The distance between mid coxae a little more than that between fore ones and that between hind ones, in turn, a little more than the distance between fore coxae. Mesosternum rather excavated and a medial carina at bottom. Metasternum flattened, with well raised medial suture and shallower emargination of hind edge between coxae. Intercoxal line well expressed and disposed far behind fore edge of metasternum almost rectalinearly joining the middles of mid coxal cavities. Caudal marginal lines behind mid coxae well expressed and forming a moderately large triangle at fore corner of metasternum (laterosternite). Caudal marginal line behind hind coxal cavities gently and archedly deviated in medial part of hind edge of coxae and returned to it at the middle of cavity. Hypopygidium 1.5 times longer than 1st ventrite and with distinctly angular apex. Legs rather stout and short. Tibiae triangular: fore one 1 and $^1/_3$ wider than antennal club and finely crenulate along outer edge; mid and hind ones a little wider than antennal club and

with 2 longitudinal rows of not dense, rather long and moderately thick hairs along their outer edge. Femora with usual outlines of gently convex fore and hind edges: fore one nearly as wide as, mid and hind ones 1.5 times wider than corresponding tibiae. Fore tarsi nearly as wide as antennal club, but mid and hind ones much narrower, with simple and long claws. Aedeagus well sclerotized.

Female. Externally differs from male by narrower fore tibiae and tarsi (former as wide as and latter narrower than antennal club), widely rounded pygidial and hypopygidial apices. Ovipositor moderately sclerotized.

Variation. Length 2.7—5.0 mm. General coloration varies from light reddish to dark brown, frequently with more or less lightened pronotal sides and appendages, or sometimes scutellar parts of elytra and head also lightened. Large specimens are with comparatively wider pronotal and elytral bases and more narrowed sides of pronotum anteriorly and elytra posteriorly. Elytral surface frequently has a rasp-like view. Pubescence in many specimens recently collected strongly contrast. Some variations are expressed in punctuation and sculpture of surface.

Notes. This monotypic genus has an intermediate position between the genera *Idaethina* Reitter, 1875 from Australia and *Neopocadius* Grouvelle, 1906 from Argentina, but differs from both groups by more deeply excised labrum, carinate mesosternum, well expressed intercoxal line disposed far behind fore edge of metasternum, more approached one to another hind coxae and characteristic genital structures in both sexes. Besides that, *Braunthina aequalis* gen. et sp. n. is distinct from the first also by unhaired eye facets, uniform elytral punctuation and weak sexual dimorphism in tibial shape, and from the second — by character of dorsal punctuation and pubescence and unwidened apex of prosternal process.

Generic name of this new genus is created to be devoted to T. Broun who more successfully investigated the Coleoptera of New Zealand than anyone before him.

13. Subgenus *Olliffura* Jelinek & Kirejtshuk, 1986 was proposed in Kirejtshuk (1986a).

14. Genus *Strongyllodes* Kirejtshuk, 1992 is mainly distributed in the Madagascarean, Indo-Malayan and Australian regions coming to the north up to Korea and Russian Far East. This genus is quite distinctly separated from the Mediterranean *Xenostrongylus* Wollaston, 1854 by more strongly and evenly convex oval body, less anteriorly projected head and especially elytral epipleura steeply sloped downwards.

## Zusammenfassung

Die Arbeit behandelt das mehrfache unabhängige Auftreten von Anthophagie bei verschiedenen Gruppen von Glanzkäfern der Familie Nitidulidae. Verlauf und Regelhaftigkeiten dieses Evolutionsprozesses werden dargestellt. Ähnliche Korrelationen in den Abwandlungen von Strukturen, Ernährungs- und Lebensweisen von anderen, nicht näher verwandten anthophagen Gruppen werden gezeigt. *Propetes* (*Propetes*) *aquilus* sp. n., *P.* (*P.*) *seychellensis* sp. n., *P.* (*Mandipetes*) *intritus* subgen. et sp. n., *P.* (*M.*) *longipes* sp. n., *Brounthina aequalis* gen. et sp. n., *Caplothorax* subgen. n. und *Plapennipolus* subgen. n. in der Gattung *Carpophilus* und *Urocarpolus* subgen. n. in der Gattung *Nitops* stat. n. werden als neue Taxa vorgeschlagen und beschrieben.

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Dr. Alexander G. Kirejtshuk, Zoological Institute of Russian Academy of Sciences, Sanct-Petersburg, 199034 Russia.